

## ABSTRACT

Disclosed are methods of making a photocatalyst by loading titanium dioxide film on a flexible substrate, comprising the steps of: (1) Preparing an active layer sol-gel by: (a) Making a precursor solution comprising n-butyl titanate, ethanol, diethanolamine, and water; (b) 5 Adding a pore-forming agent selected from the group consisting of polyglycol, octadecylamine, and mixtures thereof to the precursor solution; and (c) Placing the resulting solution in a sealed gelatinization process for at least 3 days; and (2) Preparing an active TiO<sub>2</sub> photocatalyst layer by: (a) Coating a flexible substrate with the active 10 layer sol-gel prepared according to step (1) using a pulling and coating process; (b) Drying the coated flexible substrate; and (c) Placing the coated, dried flexible substrate in a hydrothermal kettle for thermal crystallization in a mixed solvent of ethanol and water at 60-200°C. Further disclosed are methods wherein the precursor solution comprises 15 titanium tetrachloride, ethanol, and water.